GPS Methodology and Mileage Variation in Researching Marine Canines

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Introduction:

- Improvised Detection Dogs (IDD) play a large role in modern warfare in ensuring the safety of our nation's soldiers by locating improvised explosive devices (IEDs).
- Canine hydration in extreme heat is one of the greatest challenges faced by the military IED detection dog program.
- Current hydration research utilizes Global Positioning System (GPS) tracking collars as a means to monitor and record canine performance during the conditioning program.
- Understanding the factors that influence mileage variability is critical to correctly designing experiments and revealing possible improvements in canine performance.

Methods:

Preliminary Measurement: Sixteen dogs were exercised unrestrained for three hours, every other day, for three days. Mileages were recorded with the GPS collars. Averages for the individual dogs were determined, and the dogs were equally distributed into two study groups according to their averages. The control group received standard amounts of dietary protein. The experimental group received lower amounts of protein to determine whether dietary protein affects hydration during exercise.
IDD Conditioning Program: The sixteen dogs followed the military IDD conditioning program over a six week period. Mileages were recorded.

	Days of Exercise	Duration of Unrestrained Movement
Week 1	3 days	3 hours
Week 2	5 days	3 hours
Week 3	3 days	4 hours
Week 4	4 days	4 hours
Week 5	3 days	5 hours
Week 6	5 days	5 hours

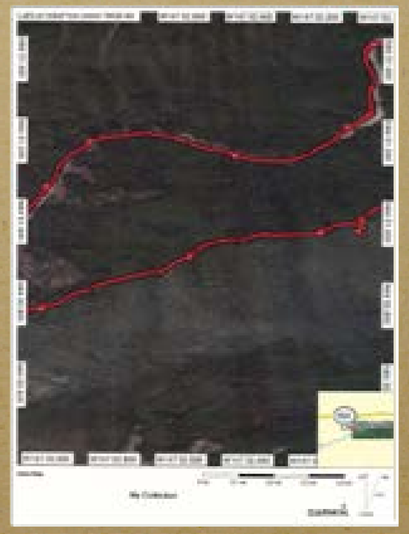
Question:

What factors influence the variability of the voluntary canine mileages during the IDD conditioning program, and how can future research account for this variability?

Possible Factors:

1. Duration of Unrestrained Movement
2. Individual Dog
3. Amount of Protein
4. Consecutive Walks

Honda Track 6/24/2013
Total Miles: 18.0



Spicy Track 6/24/2013
Total Miles: 12.9

Research dogs Dingle, Tug, Lester, Nelson, and Beemer exercising while wearing GPS collars.

Results:

	Miles		Percentage of Preliminary Miles*	
	Low P-value	High P-value	Low P-value	High P-value
Week (Exercise Duration)	<.0001	<.0001	<.0001	<.0001
Amount of Protein	0.2559	0.9221	0.0775	0.9390
Consecutive Walks	0.0116	0.8973	0.0686	0.9472

* Each dog mileage as a percentage of preliminary study average

Conclusions:

1. Duration of Unstrained Movement: As hypothesized, the duration of unrestrained movement is statistically significant. The number of miles increases as the duration of movement increases.
2. Individual Dog: The GPS methodology effectively reduced the variability in mileages by allocating the dogs to each study group based on their average miles. This is shown by the percentage of preliminary miles not reducing the variability of the original miles in the p-values.
3. Amount of Protein: The amount of protein was not statistically significant and did not affect the variability of the canine mileages in this particular study. Further blood analysis was conducted to examine the physiological effects of protein amounts on the hydration of the dog. The results are still being analyzed.
4. Consecutive Walks- Consecutive walks were not a statistically significant factor in the variability of canine mileages.